Attack of the Killer Anthracnose!

Control of Dogwood Anthracnose

Take anything you don't hurt my dogwood!

VOCABULARY

Vocabulary marked in article in italics

Anthracnose (an thrak' nose)
Plant disease identified by dark spots and blisters; caused by imperfect fungi

Conidia (ka nid' e a)
A spore which develops into Anthracnose

Control
Organism or object used for comparison in an experiment

Dogwood
A type of deciduous tree with flowers

Fungicide
An agent that destroys fungi or prevents its growth

Fungus
Organism that contains no chlorophyll and is parasitic; for example, mold, mushrooms, mildew

Landscape
The visual land, such as trees, water, and sky

Photosynthesis
Formation of carbohydrates when chlorophyll is exposed to light; refers to the ability of plants to make their own food with the use of sunlight

Adapted from
Britton, Kerry O. 1995. Epidemiology and control of Dogwood Anthracnose. IUFRO Working Group. In Caprettig P. *et al.* eds., *Shoot and Foliage Disease in Forest Trees, Party Proceedings*. pp. 96-99.

The scientist in this study used a popular scientific technique to compare **experimental treatments** to normal conditions. In this study, the scientist compared trees sprayed with chemicals (the experimental treatment) to trees that were not sprayed with chemicals. The trees which were not sprayed are called ***controls***. *Controls* are used in many types of experimental research. They help scientists to evaluate the usefulness of the experimental treatments.

Discovery

Mix flour, water, and sugar in the proper proportions to make bread dough. Add a package of dry bread yeast (a type of fungi) which has been dissolved in a glass of water. Divide the dough into three equal parts and put each part in a pan. Put one pan in a hot place (such as a 400 degree oven), one in a cold place (such as a refrigerator), and one in a warm place (such as your classroom). Observe and compare the three loaves after a couple of hours.

Under which environmental condition is the yeast the most active (that is, which loaf has expanded the most in size)? Does this experiment use a control? Why do you think a control is or is not needed for this experiment? What can you conclude from this experiment?

Introduction

Many diseases affect the health of trees throughout the United States. One species affected in the eastern part of the country is the *Dogwood*. The *Dogwood* is affected by a disease called *Dogwood Anthracnose*. The symptoms of *Dogwood Anthracnose* include leafspots that begin at the tips of leaves (Fig. 1, page 15). If the weather is hot and dry, the disease will not spread. If the weather is warm, wet, and humid, however, the disease is likely to spread. *Conidia* are like the seeds of the *fungus* which are responsible for spreading the disease. *Conidia* are spread by splashing rain and can infect other leaves if they remain wet for up to 48 hours.

The lower branches of the tree are the first victims of the disease. The fungus enters through the leaves on the sprouts and grows into the tree trunk. This can cause the tree to die quickly. *Conidia* can survive on twigs and dead leaves over the winter. Once the leaves die, the tree's health is in danger (Fig. 2). Without leaves, *photosynthesis* does not take place and the tree eventually dies.

The *Dogwood* is one of people's favorite trees in the south. Many homeowners use the *Dogwood* for landscaping around their homes. For this reason, Kerry O. Britton studies *Dogwood Anthracnose* to find out what is most effective for preventing it.

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Methods

The scientist put two-year-old, healthy dogwood seedlings into pots and placed them under an infected tree in southwestern North Carolina. By doing this, Dr. Britton could be sure the healthy seedlings would be at risk for infection from *Dogwood Anthracnose*. Remember the disease is spread during rainy weather. The seedlings were sprayed with two types of *fungicides*, which we call F1 and F2 for short. Spraying occurred at different time intervals to determine how long the *fungicides* worked. Dr. Britton also observed untreated seedlings to measure how quickly the disease spread. The seedlings that were not sprayed are known as "*controls,*" and they show the difference between treated and untreated trees. Dr. Britton counted the dead leaves on each tree to determine which type of *fungicide* was more effective and economical to use.

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Reflection

1 What problem is the scientist trying to solve?

2 Why do you think the disease spreads much more rapidly when there is a lot of moisture? (HINT: Do mushrooms and mildew, other types of fungi, grow better in wet or dry conditions?)

Fig. 1: Displays the beginning stages of Dogwood Anthracnose. Notice the leaf spots beginning to develop.

Fig. 2: Here, leaves are rotted and killed as a result of being heavily infected with Dogwood Anthracnose

Results

Dr. Britton found that F1 and F2 were equally effective in the treatment of *Dogwood Anthracnose*. The only difference between the two *fungicides* was that it took fewer applications of F1 to prevent the disease. The scientist found that six treatments throughout the summer stopped the disease very well. It took twelve treatments of F2 to equal the effectiveness of F1. Dr. Britton also found that treating infected leaves which had been wet for over a 48 hour period with F1 proved to be very effective. F1 can kill the *fungus* even after the *fungus* gets inside the leaves. It only took two applications during wet weather throughout the whole summer to stop the disease.

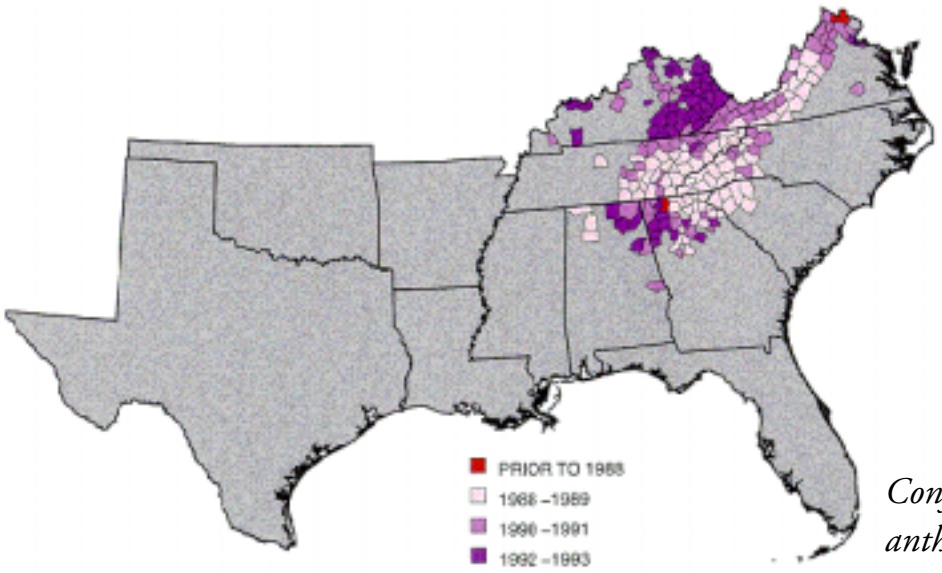
Reflection

1 Why do you think the scientist used many different time intervals for spraying the trees?

2 Why do you think scientists use a control (untreated seedlings) in their research?

3 What do you think would have happened to the healthy seedlings if there had been no rain during the experiement?

Homeowners might favor F1 because it requires fewer applications. F1 *fungicide* is more expensive, but usually equals the price of F2 after the additional applications of F2 have been applied for effective results. With proper timing during wet weather, the disease can be prevented with fewer applications of F1.



Confirmed dogwood anthracnose infections by county.

Reflection

1 Why do you think it is important to find the most effective chemical and at the same time make sure it is not too expenisive?

2 Which *fungicide,* if any, would you use on your own Dogwood trees to kill the disease? Why?